Rocky Flats Environmental Technology Site

MAN-077-DDCP

DECONTAMINATION AND DECOMMISSIONING CHARACTERIZATION PROTOCOL

REVISION 0

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EXECUTIVE SUMMARY

Kaiser-Hill Company, L.L.C. (K-H), the U.S. Department of Energy/Rocky Flats Field Office (DOE/RFFO), the Colorado Department of Public Health and Environment (CDPHE), and the U.S. Environmental Protection Agency (EPA) agree that building and facility characterization needs to be consistent when applied throughout the decommissioning program. To support this effort, the EPA Data Quality Objective (DQO) process **SHALL** be applied to the characterization process across the Special Nuclear Materials (SNM) Consolidation; Deactivation and Decontamination and Decommissioning (D&D) Program.

The Rocky Flats Environmental Technology Site (RFETS) D&D Characterization Protocol implements the requirements of the Facility Disposition Program Manual and provides direction for conducting characterizations within Type 1, 2 and 3 facilities. The NUREG 1575, Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), issued in December 1997, and this document describe the key D&D characterization phases, establishes DQOs for the various phases, and presents related data review requirements. This document is to be used in preparing project-specific documents that comply with the Rocky Flats Cleanup Agreement (RFCA).

ABBREVIATIONS/ACRONYMS

ACM	Asbestos-containing material
CCR	Code of Colorado Regulations
CDPHE	Colorado Department of Public Health and the Environment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CHWA	Colorado Hazardous Waste Act
D&D	Decontamination and Decommissioning
DOE	U.S. Department of Energy
DOP	Decommissioning Operations Plan
DPP	Decommissioning Program Plan
DQA	Data Quality Assessment
DQO	Data Quality Objectives
EDD	Electronic Data Deliverable
EPA	U.S. Environmental Protection Agency
FSS	Final Status Survey
FSSP	Final Status Survey Plan
FSSR	Final Status Survey Report
HASP	Health and Safety Plan
HSA	Historical Site Assessment
IM/IRA	Interim Measure/Interim Remedial Action
IMP	Integrated Monitoring Plan
IPC	In-Process Characterization
K-H	Kaiser-Hill Company, L.L.C.
LCSD	Laboratory Control Sample Duplicate
LLMW	Low-Level Mixed Waste
LLW	Low-level Waste
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MDA	Minimum Detectable Activity
Mg/l	Milligram/Liter
MRI	Midwest Research Institute
NRA	No Radiation Added
PARCC	Precision, Accuracy, Representativeness, Completeness, and Comparability
PCBs	Polychlorinated Biphenyl's
PPE	Personal Protective Equipment
PQL	Practical Quantitation Limit
QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
QAPjP	Quality Assurance Project Plan
QAPP	Quality Assurance Program Plan
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RFCA	Rocky Flats Cleanup Agreement
RFETS	Rocky Flats Environmental Technology Site
RFFO	Rocky Flats Field Office
RIRs	Radiological Improvement Reports
RLC	Reconnaissance Level Characterization

ABBREVIATIONS/ACRONYMS (cont'd)

RLCP	Reconnaissance Level Characterization Plan
RLCR	Reconnaissance Level Characterization Report
SAP	Sampling and Analysis Plan
SNM	Special Nuclear Materials
SOW	Statement of Work
TCLP	Toxicity Characteristic Leaching Procedure
TRU	Transuranic
TSCA	Toxic Substances Control Act
TSDF	Treatment, Storage, and Disposal Facility
UCL	Upper Confidence Level
V&V	Verification and Validation
WAC	Waste Acceptance Criteria

1.0 PURPOSE

The Rocky Flats Cleanup Agreement (RFCA, 7/96) establishes the regulatory framework for cleanup and closure of the Rocky Flats Environmental Technology Site (RFETS). Building disposition, including decontamination and decommissioning (D&D), is an integral part of RFCA which requires the development and implementation of a building characterization program at RFETS. Characterization is the process of identifying the chemical and radiological hazards associated with a building or building cluster. Information gathered during characterization **SHALL** be used to support facility disposition, including selection of decommissioning alternatives and the development of project specific documentation.

This protocol presents the requirements for characterizing buildings when developing D&D alternatives for Type 1, 2 and 3 facilities, as defined in the Decommissioning Program Plan (DPP) and Section 2 of this document. K-H will use characterization data to review and evaluate the risks associated with D&D, and to define management options for building disposition.

Characterization **SHALL** be accomplished through the implementation of the U.S. Environmental Protection Agency (EPA) data quality objective (DQO) process and the application of approved and accepted characterization practices and methods. Documents used to develop this protocol include:

- Guidance for the Data Quality Objectives Process, QA/G-4, September 1994, (EPA/600-R-96/005);
- Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), Final, December 1997 (NUREG-1575, EPA 402-R-97-016);
- Decommissioning Resource Handbook, DOE/EM, August 1995;
- DOE/RFFO, CDPHE, EPA, Final Rocky Flats Cleanup Agreement (RFCA), July 19, 1996;
- 40 CFR, Protection of the Environment, and 6 CCR 1007.

1.1 OBJECTIVE

The primary objective of this document is to provide direction, in support of the D&D Program, for a compliant, consistent and systematic approach to characterizing the radiological and chemical hazards associated with buildings and building clusters at RFETS. A key tool to ensuring a consistent approach and defining the basis for characterization is the application of EPA's DQO process. Additional document objectives include:

- Sharing the following information with stakeholders:
  - -- key characterization processes and protocols to be used;
  - -- DQOs and decision rules for various types of characterization campaigns;

-- regulations and technical standards used to develop processes, protocols, DQOs and decision rules; and

- Assisting in the development of technically sound characterization documents, based on a common, consistent set of processes, protocols, DQOs and decision rules.

The benefits of using such an approach to characterization include:

- Enhanced stakeholder understanding;
- Enhanced D&D program credibility;
- Expedited approval of project-specific plans and decision documents;
- Consolidated guidance for RFETS project managers;
- Enhanced RFETS productivity;
- Pollution prevention; and
- Cost savings.

In addition, implementation of this Characterization Protocol is a component of the RFETS Integrated Safety Management System. The Protocol requires the characterization of building hazards and the evaluation of characterization data throughout the D&D process to ensure that controls remain adequate to protect RFETS workers, the public and the environment.

1.2 SCOPE OF THIS DOCUMENT

This document consists of eight main sections plus an appendix. Following Section 1 is an overview of the four phased characterization process (Section 2), and a description of EPA's seven-step DQO process and its application to D&D characterization (Section 3). Section 4 then defines the DQOs for characterization of Type 1 facilities and presents the related documentation requirements, while Section 5 defines the DQOs for characterization of Type 2 and 3 facilities and their corresponding documentation requirements. Should the DQO process identify additional data needs, the sampling and analysis requirements for non-radioactive contaminants of concern are identified in Section 6. Section 7, discusses the types of data reviews required to ensure that collected data are of sufficient quality. Section 8, references relevant records management requirements, and Section 9, identifies the references used in preparing this manual. Finally, the Appendices present logic and flow diagrams and annotated outlines for various reports.

This document does not address remediation of under building contamination. Such contamination is associated with releases from underground process waste lines, underground storage tanks, and buildings. Investigation and remediation will be managed by the RFETS Closure Projects Environmental Restoration Program.

This document does not address the evaluation of characterization data to determine impacts on environmental media such as soil, surface and ground water, and air, and to assess compliance with related environmental regulations. Evaluation of impacts to environmental media and related regulations is addressed in the RFETS Integrated Monitoring Plan (IMP). The IMP is a RFCA-mandated document that is also based on the DQO process. The IMP addresses the monitoring of environmental media on both a site-wide and project-specific basis.

For each environmental media, the IMP includes a template to develop project-specific monitoring DQOs, which would be consistent with the DQOs for routine, site-wide environmental monitoring. Integration of site-wide and project-specific monitoring **SHALL** occur during the planning of all major D&D projects. Review of the D&D projects for environmental concerns is conducted by the K-H Environmental Management and Compliance organization in response to the submittal of an environmental checklist by the project team.

1.3 USE OF THIS DOCUMENT

This document applies to all site employees and subcontractors. It is to be used to select and refine DQOs, based on the type of facility being decommissioned and the phase of decommissioning, and as a tool to prepare required characterization plans based on facility-specific conditions. Any exceptions from the requirements of this document must be granted, in writing, by the Division Manager, D&D Projects and Construction.

This document does not, and can not, specify sampling and survey methods, the location of sample and survey points, the number of samples to be collected, the size and geometry of survey grids, the analyses required, detection limits, etc. These details are facility specific and will be developed for and incorporated into facility-specific plans. This document does provide direction on development of the details, however.

This document also provides references to applicable regulations and to various characterization guidance documents and procedures. In addition, it references other D&D program documents and site infrastructure programs that should be used during D&D characterization, such as the Facility Disposition Program Manual, the D&D Quality Assurance Program Plan [being developed], and the Site's Sample Management and Waste Management Programs. Appendix A, "The RFETS Characterization Process," defines the process and requirements as they apply to SNM Programs, Type 1, 2 and 3 Facilities, and Government and Subcontractor Equipment. Those steps in the process to which the D&D Characterization Protocol applies, are "shaded" to reflect the need for D&D characterization data.

The type and extent of characterization depend, to a large degree, on the building disposition decision. This decision will determine the nature and extent of the characterization campaign. D&D Project Managers should involve various subject matter experts early in the planning process to determine characterization needs. Such coordinated planning should be used to develop cost-effective disposition options, focus characterization needs, and save money for other closure activities. Subject matters experts that should be involved in planning and formulation of DQOs include, as a minimum, specialists in the following disciplines:

- D&D technology;
- Radiological protection/nuclear safety;
- Environmental protection/compliance;
- Waste management;
- Occupational safety; and
- Industrial hygiene;

2.0 OVERVIEW OF THE CHARACTERIZATION PROCESS

Characterization is the process of identifying the chemical and radiological hazards associated with a building or building cluster. Four (4) characterization/verification phases were identified for use at RFETS: 1) Scoping Characterization/Historical Site Assessment (HSA); 2) Reconnaissance Level Characterization (RLC); 3) In-Process Characterization (IPC); and 4) Final Status Survey (FSS). These four phases were derived from the following documents: DOE/EM0142P, Manual for Conducting Radiological Surveys in Support of License Termination; DOE/EM, The Decommissioning Resource Handbook; NUREG-1575, Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM); and DOE Order 5820.2A, Radioactive Waste Management.

Characterization and decommissioning activities **SHALL** be performed in accordance with applicable regulatory requirements, including the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Resource Conservation and Recovery Act (RCRA), Toxic Substances Control Act (TSCA), Colorado Hazardous Waste Act (CHWA), RFCA, and U.S. Department of Transportation regulations (49CFR). In addition, characterization activities should be controlled by various RFETS D&D program manuals, guidance documents, and procedures (e.g., the Integrated Work Control Program, the Integrated Safety Management System, Conduct of Operations Manual, the D&D Quality Assurance Program Plan (QAPP-in preparation), the DPP, the Facility Disposition Program Manual, and RFETS Waste Management and Transportation manuals and procedures).

Through the characterization process, each RFETS facility will be "classified" based upon the level of potential or existing radiological material and/or hazardous substance contamination. Hazardous substances are listed in 40 CFR 302.4. Anticipated classification will be based on historical information and process knowledge. Site facilities will be classified, per the DPP, as one of three types:

Type 1 facilities are "free of contamination," which means the following conditions have been met:

- Hazardous wastes, if any, generated and/or stored in the facility have been previously removed in accordance with CHWA and RCRA requirements and any RCRA units have been closed or, if partially closed, the parts of the unit within the facility have been certified as being clean closed (it will be insufficient to have RCRA units simply in a RCRA stable configuration.); AND

- Routine surveys for radiological contamination performed pursuant to the RFETS radiological protection program show the building is not contaminated; AND

- Surveys, if required, for hazardous substance contamination show the building is not contaminated; AND

- If any hazardous substances including polychlorinated biphenyls (PCBs) or asbestos are present, they are an integral part of the building's structural, lighting, heating, electrical, insulation, or decorative materials. As such they are not "contamination."

Type 2 facilities contain some radiological contamination or hazardous substance contamination. The extent of the contamination is such that routine methods of decontamination should suffice and only a moderate potential exists for environmental releases during decommissioning. Some buildings in this category (e.g., buildings 865, 886, and 991) are now undergoing, or will undergo deactivation in certain areas prior to decommissioning. The mere fact that deactivation will occur does not push a building into the Type 3 category. Most buildings where industrial operations occurred that used hazardous substances or radioactive materials or both will fall into this category.

Type 3 facilities contain extensive radiological contamination, usually as a result of plutonium processing operations or accidents. Contamination may exist in gloveboxes, ventilation systems, or the building structure. Site personnel expect those buildings that were used for plutonium component production, along with the major support buildings for such production, have significant contamination, and are expected to be classified as Type 3. These buildings include: 371/374, 559, 771/774, 707, 776/777, and 779.

Each characterization phase is described in the following paragraphs. Appendix B, "The D&D Characterization Process Logic Diagram" illustrates the D&D characterization process at RFETS with respect to facility type, phase, and documentation requirements.

2.1 SCOPING CHARACTERIZATION/HISTORICAL SITE ASSESSMENT (HSA)

The Scoping Characterization and HSA phase, as defined in the DPP, establishes the scope of the project (i.e., schedule, budget, risk, and approach) and the anticipated facility type. Establishment of the scope includes identifying the physical boundaries of the areas to be characterized. The boundaries may be a cluster of related buildings, a single building, or a room/area within a building. Establishment of the anticipated facility type requires information regarding building hazards, including hazardous and radiological conditions. Information gathering includes building walk-downs, interviewing building personnel, and reviewing historical and operational building information, including historical survey reviews, Safety Analysis Reports, records, incident reports, radiological improvement reports (RIRs), Plant Action Tracking System (PATS), Historical Release Reports (HRRs), and any other pertinent Waste Stream Residue Identification and Characterization (WSRIC) information. In addition, at this time, radioactive sources **SHALL** be evaluated.

An important component of scoping is the HSA. This is an investigation to determine the historical information that may exist for a facility. The HSA **SHALL**:

- Identify potential, likely, or known sources of radiological material/hazardous substances and/or contamination, including history and nature of material/substance storage, use, spills, and waste handling;
- Provide a preliminary assessment of contaminant migration including migration pathways and human and environmental targets; and
- Provide information that may be useful in other characterization phases; and/or a recommendation on whether further action is warranted.

Scoping provides a basis for preliminary evaluations of decommissioning efforts and aids in identifying the need for more extensive RLC and IPC surveys. Scoping should be accomplished by the project team at the outset of a project. The result of this analysis is the facility classification or a modification to the classification. Results **SHALL** be incorporated into the RLC Plan as a basis for additional characterization, based on identified data gaps.

2.2 RECONNAISSANCE LEVEL CHARACTERIZATION (RLC)

Based on the DPP, this phase of characterization provides an overall assessment of the contamination, hazards, and other conditions associated with each building. The radiological and chemical (including PCBs and asbestos) condition of the building **SHALL** be assessed to identify radioactive or hazardous waste storage areas, contaminated areas and hazards, as well as physical obstacles or other conditions that could affect decommissioning activities. The RLC should obtain sufficient data to establish the basis for decommissioning activities. This phase **SHALL** include the review and comparison of information gathered during scoping to identify data gaps and determine the need for additional sampling/surveys. If data gaps are identified during the DQO process, additional sampling/surveys **SHALL** be conducted. Instructions should be developed and documented in the form of a RLC Plan (RLCP). If data gaps are not identified, additional sampling/surveys are not required and the RLC Report (RLCR) is prepared. This report identifies the proposed facility classification to the U.S. Department of Energy (DOE), the Colorado Department of Public Health and the Environment (CDPHE), and the Environmental Protection Agency.

2.3 IN-PROCESS CHARACTERIZATION (IPC)

This phase of characterization is used to evaluate on-going D&D activities, validate project plans and engineering alternatives, identify additional hazards that may be uncovered during facility strip-out and decontamination, and ensure that adequate data are obtained for waste management and transportation purposes. No formal Plan is required for agency approval, however, sampling and analysis **SHALL** be documented for this phase. Applicable results **SHALL** be documented in the FSS Plan (FSSP) and Report (FSSR)

2.4 FINAL STATUS SURVEY (FSS)

This phase of characterization is performed after strip-out and/or decontamination are complete and before building disposition. This characterization **SHALL** be used to ensure that the building surfaces and/or structures meet applicable release criteria for radiological and non-radiological constituents per the DQOs. Instructions should be developed and documented in the form of a FSS Plan, and the results **SHALL** be documented in the FSSR.

3.0 DATA QUALITY OBJECTIVES (DQOs)

This section describes the EPA DQO process (Section 3.1) and its application to D&D characterization at RFETS (Section 3.2). Establishing characterization requirements **SHALL** involve identifying the decisions to be made, as well as the data needed to make these decisions. Implementation of EPA's DQO process is necessary to determine the data needs, i.e., sample design, of each D&D project, and to optimize the number and types of

measurements and analyses relative to the available resources and ultimate project decisions. In short, the DQO process is a systematic means to ensure that are acquired and evaluated according to their intended use. Coupled with Verification & Validation (V&V), DQOs establish a framework that is legally and technically defensible so that decisions based on the data will, likewise, be legally and technically defensible.

3.1 DQO STEPS

The DQO process is comprised of the following seven major steps:

1. State the Problem;
2. Identify the Decision;
3. Identify the Inputs to the Decision;
4. Define the Boundaries of the Decision;
5. Develop the Decision Rule;
6. Specify Tolerable Limits on Decision Errors; and
7. Optimize the Design for Obtaining Data.

The following discussion addresses each of the seven steps with respect to D&D activities at the RFETS. Experience has shown that DQOs must be discussed in increasingly specific terms relative to program goals and project-specific goals as appropriate.

3.1.1 The Problems

The quantities and types of contaminated media, materials, equipment, and structures, floors, walls, and ceilings are not known with quantifiable confidence, and must be determined before an approach to D&D and the management of waste streams can be performed. Surveys/samples must be taken to properly characterize and manage the materials and/or equipment resulting from the D&D process. Other problems relevant to final project actions might include:

- Why perform this characterization?
- What is the end use of the material, equipment, facility, or structure (free release, restricted use, etc.)?

3.1.2 The Decisions

Because D&D decisions determine data needs, decisions must be clear and well defined so that data needs may be clearly defined.

The critical technical decisions to be made are as follows

- What types and quantities of materials (e.g., paint, concrete, pipe insulation, etc.), media (e.g., oil, solid, sludge, etc.), or equipment within the facility or area are contaminated and, conversely, not contaminated?

- What are the categories of waste streams that will result from the activity (hazardous, non-hazardous, radiological, etc.)?

- What is the ultimate disposition of the waste streams (i.e., waste classification and treatment, storage, and disposal facility (TSDF) location) including quantities relative to the waste acceptance criteria (WAC)?

3.1.3 Inputs to the Decisions

Inputs to the decisions include both qualitative and quantitative data. Qualitative information typically consists of process knowledge derived from operating records and interviews, and nominal data (e.g., paint color, texture, or equipment type, etc.) derived from visual observation of a buildings equipment and materials. Quantitative data may be produced from analytical, radiation and other field surveys, and/or petrographic (asbestos) analysis of samples. Input can also includes historical data, provided quality control has been adequately established.

Inputs to the decision may include the following:

- Analytical results;
- Analytical quality control (QC) data;
- Radiological survey results;
- Radiological survey QC data;
- Method-specific sensitivities (e.g., detection limits or minimum detectable activities);
- Error tolerances associated with the measurements (e.g., accuracy and precision); and
- Action levels (e.g., regulatory thresholds from RFETS free-release criteria or RFCA).

WAC and associated implementing procedures are typically the drivers for decision inputs where data will be used to characterize waste streams destined for a particular TSDF (e.g., Waste Isolation Pilot Plant/RFETS QAPjP, Nevada Test Site, Envirocare or USA Waste). Inputs to the decisions will be Contaminants Of Concern specific. Waste types also will be categorized by Contaminants Of Concern.

3.1.4 Decision Boundaries

Decision boundaries include the geographic area(s), volume(s), and temporal boundaries of the characterization activity. Temporal boundaries are generally reflected in environmental regulations and refer to frequency of data collection, the period of time a standard cannot be exceeded, and the period of time over which data should be averaged.

Other means of defining the project boundaries may be derived from the following questions:

- What is the sample population of interest?
- Are there any constraints (physical/temporal) on data collection?

3.1.5 Decision Rules

Decision rules are a series of "if-then" rules developed to establish the basis on which decisions are made. Decision rules must be based on objective, reproducible, and measurable criteria,

and must be consistent with information developed during the first four steps of the DQO process. All decision rules **SHALL** be considered prior to finalizing the characterization plan.

3.1.6 Tolerable Limits on Decision Errors

The amount of acceptable uncertainty associated with analytical results, radiological surveys, or radiochemistry results must be established in the planning phases of the D&D activity and accepted by mutual consensus of the parties involved, i.e., K-H and their related subcontractor(s), and the DOE Rocky Flats Field Office (RFFO). Mutual consensus is documented by concurrence or approval from the affected parties, such as formal correspondence and/or signature pages contained within the controlled documents.

Limits on decision errors directly affect the quantity of samples required for statistical adequacy: the higher the confidence required in the decision, the more samples are required. Thus, the adequacy of the sampling set, relative to the number of samples taken, is also determined in this step of the DQO process. Based on the amount of error, or risk, that the project is willing to accept, the number of required samples can be calculated through EPA QA/G-4 and/or Cost Benefit Enhancements (DOE/EM-0316).

Acceptable false positive and false negative (Type I and Type II) errors generally range from 1% to 10% (i.e., confidences from 99% to 90%), respectively. In this protocol, the acceptable decision error limit is 5%, which translates to an upper confidence level (UCL) of 95%.

3.1.7 Optimization of Design

The DQOs may be modified in response to visual observations, new information that reveals data gaps as the project progresses, and professional judgment, all of which are documented in the characterization process or in the Data Quality Assessment (DQA). If data gaps are identified, additional sampling must be conducted. The sampling design is modified and optimized until the required, minimum confidence is achieved for the associated project decisions. The design may go through several iterations of optimization, depending on the sample data available and the inferences made from each unique sample set.

3.2 APPLICATION OF DQOs TO THE D&D CLOSURE PROGRAM

As stated in Section 1.3, DQOs presented in this document **SHALL** be selected, refined as necessary, and incorporated into characterization planning documents based on the type of facility being decommissioned and the phase of decommissioning. Type 1 facilities **SHALL** undergo a combined RLC and FSS before being dispositioned (see Section 4.0).

Type 2 and 3 facilities will undergo RLC, IPC, and FSS, with each phase of characterization using a different set of DQOs (see Section 5.0).

Data sets from previous characterizations serve as a key input to each characterization phase and its related set of DQOs. Such data can significantly assist in focusing on the next Characterization phase, thereby resulting in cost savings. The usefulness of previous data, however, will depend on its quality.

A means to ensure adequate data quality is adherence to this characterization protocol throughout facility disposition and characterization activities. Characterization results are to be used by the project team to make various D&D decisions, such as technology selection, alternatives development, material release, and waste management. Results will also be used by other K-H Team organizations to make other project-related decisions relating to occupational safety, industrial hygiene, environmental protection, regulatory compliance, etc. Therefore, D&D project personnel **SHALL** provide characterization results to all appropriate K-H Team organizations.

4.0 TYPE 1 FACILITIES

This section defines the DQOs for characterization of Type 1 facilities, and presents the related documentation requirements. Only one set of DQOs **SHALL** be used for the combined RLC and FSS. If contamination is encountered during characterization, the facility may be re-categorized, and characterization requirements **SHALL** be changed (see Appendix B). Documentation requirements for Type 1 facilities include RLC/FSS.

4.1 DQOs FOR RCL/FSS

4.1.1 The Problem

- Is the amount of material, media, equipment, floors, walls and ceilings, interior/exterior to the buildings adequately quantified?

- Is the nature and extent of radiological and hazardous substance contamination known through HSA, process knowledge/history or adequately characterized so that material, media, equipment, floors, walls and ceilings are considered to be sanitary waste?

4.1.2 The Decision

- Is there an inventory/estimate of materials, media, equipment, floors, walls and ceilings, interior/exterior to the building(s)?

- Is there sufficient process knowledge/history or sufficient radiological, RCRA, TSCA, and asbestos data to adequately characterize materials, media, equipment, floors, walls and ceilings so they are considered to be sanitary waste?

4.1.3 Inputs to the Decision

- Assess magnitude and location of data from scoping/HSA.

- Identify applicable action levels, unrestricted release criteria, transportation requirements, waste management regulations, pollution prevention/waste minimization criteria, and the disposal facilities' WAC.

4.1.4 Decision Boundaries

- Identify spatial confines of building, including room, sets of rooms, or facility in 2 and 3 dimensions. Use engineering drawings for definition where available. (The accuracy of the drawings **SHALL** be verified prior to use).

- Include temporal aspects of the project and applicable regulations.

The characterization boundaries are limited to the spatial confines of the facility itself and materials, equipment, equipment components, and media that make-up or are within the buildings (interior and exterior).

4.1.5 Decision Rules

- If there is an inventory/estimate of remaining materials, media, equipment, floors, walls and ceilings within the building, no inventory/estimates are necessary; otherwise inventory/estimates are necessary.

- If materials are found to be non-radioactive, non-hazardous, non-beryllium contaminated, non-TSCA and non-asbestos containing material (ACM), then material can be free-released or managed as sanitary waste **(refer to criteria presented below).**

Radionuclides

- For materials, media, equipment, floors, walls and ceilings:

  1. If process knowledge/history (see Section 4.2) supports the premise that no radioactive contamination is present, the related area and/or volume of material is considered sanitary waste or may be free-released.

  2. If all radiological survey measurements are below the surface contamination thresholds provided in DOE Order 5400.5 (Radiation Protection of the Public and Environment) and/or are within background concentrations for volume contaminated material, the related area or volume of material is considered sanitary waste or may be free-released.

  3. If all radiological sample measurements are below the volume contamination thresholds provided in the No-Rad-Added Verification (NRA) Program, the related volume of material is considered sanitary waste or may be free released.

  4. If any radiological survey measurements exceed the surface contamination thresholds provided in DOE Order 5400.5, the related area or volume of material is considered low-level waste (LLW).

5. If any radiological sample measurement exceeds the volume contamination threshold provided in the NRA Program, the related volume of material is considered LLW.

6. If any radiological sample measurements exceed 100 nanocuries/gram of plutonium and/or americium for volume contaminated material, the related volume of material is considered transuranic (TRU) waste.

RCRA Constituents

- If the waste is mixed with or contains a listed hazardous waste, or if the waste exhibits a characteristic of a hazardous waste, then the waste is considered RCRA-regulated hazardous waste in accordance with 6 CCR 1007-3, Part 261; otherwise, the waste is considered non-hazardous.

Beryllium

- If concentrations of beryllium are equal to or greater than 0.2ug/100 cm^2, the material is considered beryllium contaminated per the Occupational Safety and Industrial Hygiene Program Manual, Chapter 28, Chronic Beryllium Disease Prevention Program; otherwise the material is considered non-beryllium contaminated.

PCBs

- If PCB's are only suspected in or on materials that fall within the definition of "PCB Bulk Product Waste," sampling is not required and material can be free-released or managed as sanitary waste.

- If the 95% UCL of the mean value of the sample set exceeds 50 ppm or other applicable RFCA decision document threshold, then the associated material is considered TSCA waste; otherwise the material is considered non-TSCA waste.

Asbestos

- If any one sample of a sample set representing a homogeneous medium results in a positive detection (i.e., >1% by volume), then material is considered ACM; otherwise the material is considered non-ACM (40 CFR 763 and 5 CCR 1001-10).

4.1.6 Tolerable Limits on Decision Errors

- The maximum value for false positive and false negative errors is 5% when calculating the number of samples required.

- Decision error does not apply to asbestos sample sets per 40 CFR 763. Results are compared with the action levels on a sample-by-sample basis.

4.1.7 Optimization of Plan Design

- If radiological, RCRA, TSCA and asbestos survey/samples are not required per the DQO process, a survey/sampling plan is not required.

- If RCRA, TSCA or asbestos survey/samples are required for materials, media, equipment, floor, wall and ceilings, refer to Section 6.0.

- If radiological survey/samples are required for floors, walls and ceilings, then:

    1. a statistically based radiological survey/sampling program **SHALL** be developed per the requirements in Section 5.0 of the MARSSIM.

    2. the location of radiological survey/sampling points **SHALL** be delineated per the requirements in Section 5.5 of the MARSSIM.

    3. radiological field measurement methods and instrumentation **SHALL** be delineated per the requirements in Section 6 of the MARSSIM.

    4. radiological sampling and preparation for laboratory measurements **SHALL** be delineated per the requirements in Section 7 of the MARSSIM.

- If radiological survey/samples are required for materials, media and equipment, then a radiological survey/sampling plan **SHALL** be developed per the requirement in Health and Safety Plan (HSP) 18.10, Radioactive Material Transfer and Unrestricted Release of Property and Waste.

4.2 DOCUMENTATION REQUIREMENTS

Type 1 facilities require two characterization documents: a RLC/FSS Plan and a RLC/FSS Report.

4.2.1 RLC/FSS Plan

Because anticipated Type 1 facilities are assumed to be free of contamination, these facilities can undergo a combined RLC/FSS to confirm that they are contamination free. The combined RLC/FSS Plan **SHALL** identify building conditions and contamination per the DQOs identified in Section 4.1 and establish the basis for project planning, including facility strip-out, and demolition or re-use.

Characterization **SHALL** be based on process knowledge and/or history or on surveys/samples as required. If process knowledge/history is inadequate for characterization, appropriate characterization survey/samples **SHALL** be collected through selection and implementation of the appropriate combination of direct measurement, sample collection and laboratory analysis, and physical observation. **An annotated outline for the RLC/FSS Plan is presented in the Appendix C.**

4.2.2 RLC/FSS Report

The characterization process results are documented in the RLC/FSS Report. The report **SHALL** provide an analysis of the characterization/survey results and summarize the hazards and risks associated with them. The report **SHALL** document the process knowledge and/or history and/or characterization survey results that demonstrates the building can be managed as sanitary waste. **An annotated outline for the RLC/FSS Report is presented in the Appendix C.**

Final reports containing survey and analytical results **SHALL** describe the results of QC measurements, applicable audits, and confirmation sample comparisons performed for each sampling and analysis task as defined in the D&D QA Program Plan. Any quality problems associated with the data (including field and confirmatory data), **SHALL** be documented with the corrective actions taken in response to the deficiencies identified. Data review requirements are discussed in Section 7.0.

5.0 TYPE 2 AND TYPE 3 FACILITIES

This section defines the three possible sets of DQOs that may be associated with the three characterization phases of Type 2 and Type 3 facilities: RLC, IPC, and FSS, and related documentation requirements. DQOs for each of these characterizations are outlined in Sections 5.1, 5.2, and 5.3. Documentation requirements for Type 2 and Type 3 facilities are presented in Section 5.4.

5.1 DQOs FOR RLC

5.1.1 The Problems

- Is the amount of material, media, equipment, floors, walls, and ceilings, interior/exterior to the building adequately quantified?

- Is the nature and extent of radiological and hazardous substance contamination adequately characterized so that material, media, equipment, floors, walls and ceilings can be categorized as sanitary, LLW, low-level mixed waste (LLMW), transuranic (TRU) waste, TRU mixed Waste, RCRA waste, TSCA waste, or asbestos-containing waste?

5.1.2 The Decisions

- Is there an inventory/estimate of materials, media, equipment, floors, walls and ceilings interior/exterior to the building(s)?

- Are there sufficient data to adequately characterize materials, media, equipment, floors, walls and ceilings as sanitary, LLW, LLMW, TRU waste, TRU mixed waste, RCRA waste, TSCA waste, or asbestos-containing waste and meet transportation requirements?

5.1.3 Inputs to the Decision

- Assess magnitude and location of data from scoping characterization.
- Identify applicable action levels, unrestricted release criteria, transportation requirements, waste management regulations, pollution prevention/waste minimization criteria, and the disposal facilities' WAC.

5.1.4 Decision Boundaries

- Identify spatial confines of building, including room, sets of rooms or facility in 2 and 3 dimensions. Use engineering drawings for definition where available. (The accuracy of the drawings **SHALL** be verified prior to use).
- Include temporal aspects of the project and applicable regulations.

The characterization boundaries are limited to the spatial confines of the facility itself and materials, equipment, equipment components, and media that make-up or are within the buildings (interior and exterior).

5.1.5 Decision Rules

- If there is an inventory/estimate of remaining materials, media, equipment, floors, walls and ceilings within the building, no additional inventory/estimate is necessary; otherwise, inventory/estimates are necessary.
- If materials are found to be non-radioactive, non-hazardous, non-beryllium contaminated, non-TSCA-regulated and non-ACM, then material can be free-released or managed as sanitary waste **(refer to criteria listed below).**

Radionuclides

- For materials, media, equipment, floors, walls and ceilings:

  1. If all radiological survey measurements are below the surface contamination thresholds provided in DOE Order 5400.5, the related area or volume of material is considered sanitary waste or may be free-released.

  2. If all radiological sample measurements are below the volume contamination thresholds provided in the No-Rad-Added Verification (NRA) Program, the related volume of material is considered sanitary waste or may be free released.

  3. If any radiological survey measurement exceeds the surface contamination thresholds provided in DOE Order 5400.5, the related area or volume of material is considered LLW.

4. If any radiological sample measurement exceeds the volume contamination Threshold provided in the NRA Program, the related volume of material is considered LLW.

5. If any radiological sample measurements exceed 100 nanocuries/gram of plutonium and/or americium for volume contaminated material, the related volume of material is considered transuranic (TRU) waste.

RCRA Constituents

- If the waste is mixed with or contains a listed hazardous waste, or if the waste exhibits a characteristic of a hazardous waste, then the waste is considered RCRA-regulated hazardous waste in accordance with 6 CCR 1007-3, Part 261; otherwise, the waste is considered non-hazardous.

Beryllium

- If concentrations of beryllium are equal to or greater than 0.2ug/100 cm^2, the material is considered beryllium contaminated per the Occupational Safety and Industrial Hygiene Program Manual, Chapter 28, Chronic Beryllium Disease Prevention Program; otherwise the material is considered non-beryllium contaminated.

PCBs

- If PCB's are only suspected in or on materials that fall within the definition of "PCB Bulk Product Waste," sampling is not required and material can be free-released or managed as sanitary waste.

- If the 95% UCL of the mean value of the sample set exceeds 50 ppm or other applicable RFCA decision document threshold, then associated material is considered TSCA waste; otherwise material is considered non-TSCA waste.

Asbestos

- If any one sample of a sample set representing a homogeneous medium results in a positive detection (i.e.,>1% by volume), the material is considered ACM; otherwise the material is considered non-ACM (40 CFR 763 and 5 CCR 1001-10).

5.1.6 Tolerable Limits on Decision Errors

- For radionuclides, no statistically based sample sets are required, thus decision errors do not apply.

- The maximum value for false positive and false negative errors is 5% when calculating the number of samples required for RCRA and TSCA characterization.

- Decision error does not apply to asbestos sample sets per 40 CFR 763 and 5 CCR 1001-10. Results are compared with the action levels on a sample-by-sample basis.

5.1.7 Optimization of Plan Design

- A subjective radiological survey/sampling plan will be developed. This plan is developed to initially classify materials, media, equipment, floors, walls and ceilings as sanitary, LLW and TRU waste for decontamination and waste classification purposes.

- Radiological field measurement methods and instrumentation are described in Section 6 of MARSSIM.

- Radiological sampling and preparation for laboratory measurements are described in Section 7 of MARSSIM.

- If RCRA, TSCA or asbestos survey samples are required for materials, media, equipment, floors, walls and ceilings, refer to Section 6.0.

5.2 DQOs FOR IPC

5.2.1 The Problems

During strip-out:

- Is the amount of material, media, equipment, floors, walls and ceilings, interior/exterior to the buildings adequately quantified?

- Is the nature and extent of radiological material and hazardous substance contamination adequately characterized so that material, media, equipment, floors, walls and ceilings can be categorized as sanitary, LLW, LLMW, TRU waste, TRU mixed waste, RCRA waste, TSCA waste, or asbestos-containing waste?

5.2.2 The Decisions

During strip-out:

- Is there an inventory/estimate of materials, media, equipment, floors, walls and ceilings, interior/exterior to the building(s)?

- Are there sufficient data to adequately characterize all materials, media, equipment, floors, walls, and ceilings as sanitary, LLW, LLMW, TRU waste, TRU mixed waste, RCRA waste, TSCA waste, or asbestos-containing waste?

5.2.3 Inputs to the Decision

- Assess magnitude and location of data from preceding characterizations, including data from scoping characterization, and contained in the RLCR, Decommissioning Operations Plan (DOP), and the Interim Measure/Interim Remedial Action (IM/IRA).

- Identify applicable action levels, free-release criteria, transportation requirements, health and safety requirements, waste management regulations, pollution prevention/waste minimization criteria, and the disposal facilities' WAC.

5.2.4 Decision Boundaries

- Identify spatial confines of building, including room, sets of rooms or facility in 2 and 3 dimensions. Identify changes to facility/room configuration and content resulting from strip-out and decontamination activities. Identify newly accessible and decontaminated areas.

- Include temporal aspects of the project and applicable regulations.

The characterization boundaries are limited to the spatial confines of the facility itself and materials, equipment, equipment components, and media that make-up or are within the buildings (interior and exterior).

5.2.5 Decision Rules

- If there is an inventory/estimate of remaining materials, media, equipment, floors, walls and ceilings within the building, no inventory/estimate is necessary, otherwise, inventory/estimates are necessary.

- If materials are found to be non-radioactive, non-hazardous, non-beryllium contaminated, non-TSCA-regulated and non-ACM, then material can be free-released or managed as sanitary waste **(refer to criteria listed below).**

Radionuclides

- For materials, media, equipment, floors, walls and ceilings:

  1. If all radiological survey measurements are below the surface contamination thresholds provided in DOE Order 5400.5, the related area or volume of material is considered sanitary waste or may be free-released.

  2. If all radiological sample measurements are below the volume contamination thresholds provided in the No-Rad-Added Verification (NRA) Program, the related volume of material is considered sanitary waste or may be free released.

3. If any radiological survey measurement exceeds the surface contamination thresholds provided in DOE Order 5400.5, the related area or volume of material is considered LLW.

4. If any radiological sample measurement exceeds the volume contamination threshold provided in the NRA Program, the related volume of material is considered LLW.

5. If any radiological sample measurements exceed 100 nanocuries/gram of plutonium and/or americium for volume contaminated material, the related volume of material is considered transuranic (TRU) waste.

RCRA Constituents

- If the waste is mixed with or contains a listed hazardous waste, or if the waste exhibits a characteristic of a hazardous waste, then the waste is considered RCRA-regulated hazardous waste in accordance with 6 CCR 1007-3, Part 261; otherwise, the waste is considered non-hazardous.

- If material is to be disposed as hazardous waste, the material will have to be disposed of in compliance with LDRs (40 CFR 268) and in conformance with TSDF WAC. For example, some characteristic wastes (i.e., ignitable, corrosive, reactive and organic wastes) will have to be characterized for underlying hazardous constituents.

Beryllium

- If concentrations of beryllium are equal to or greater than 0.2ug/100 cm^2, the material is considered beryllium contaminated per the Occupational Safety and Industrial Hygiene Program Manual, Chapter 28, Chronic Beryllium Disease Prevention Program; otherwise the material is considered non-beryllium contaminated.

PCBs

- If PCB's are only suspected in or on materials that fall within the definition of "PCB Bulk Product Waste," sampling is not required and material can be free-released or managed as sanitary waste (Federal Register, Vol. 63, No. 124, Section 761.62, June 29, 1998).

- If the 95% UCL of the mean value of the sample set exceeds 50 ppm or other applicable RFCA decision document threshold, then the associated material is considered TSCA waste; otherwise the material is considered non-TSCA waste.

- TSCA-regulated waste **SHALL** be characterized for disposal in accordance with 40 CFR 761. Characterization requirements vary depending on the TSCA waste type (eg., PCB liquids, PCB items, PCB remediation waste, PCB bulk product waste) and the specific disposal options allowable for each waste type under the PCB regulations.

Asbestos

- When friable and potentially friable asbestos is removed, if based on five air samples (>1200 L/sample), there are <70 (asbestos fibers)/ mm^2 as determined by Transmission Electron Microscopy and as described in 40 CFR 763, Subpart F, or 5 CCR 1001-10, Part B, Subsection III.C.6-8), the friable and potentially friable asbestos has been successfully removed; otherwise the building may contain friable asbestos.

- Asbestos waste **SHALL** be managed in accordance with 40 CFR 763, 40 CFR 261-268, CHWA and 5 CCR-1001-10, Part B.

5.2.6 Tolerable Limits on Decision Errors

- For radionuclides, no statistically based sample sets are required, thus, decision errors do not apply.

- The maximum value for false positive and false negative errors is 5% when calculating the number of samples required for RCRA and TSCA characterization.

- Decision error does not apply to asbestos sample sets per 40 CFR 763. Results are compared with the action levels on a sample-by-sample basis.

5.2.7 Optimization of Plan Design

- A discretionary radiological survey/sampling plan will be developed for remaining floors, walls, and ceilings. This plan is developed to classify floors, walls and ceilings as non-radioactive waste for FSS purposes.

- Radiological field measurement methods and instrumentation are described in Section 6 of MARSSIM.

- Radiological sampling and preparation for laboratory measurements are described in Section 7 of MARSSIM.

- For materials, media, equipment, floors, walls, and ceilings being released as low level and/or TRU waste, radiological surveys/samples **SHALL** be taken per Site Procedure 1-PRO-079-WGI-001, Waste Characterization, Generation and Packaging.

- If radiological survey/samples are required for materials, media and equipment for release as non-radioactive waste, then a radiological survey/sampling plan **SHALL**

  be developed per the requirement in the RFETS HSP 18.10, Radioactive Material Transfer and Unrestricted Release of Property and Waste.

- If RCRA, TSCA or asbestos survey/samples are required for materials, media, equipment, floors, walls and ceilings, refer to Section 6.0.

5.3 DQOs FOR FSS

5.3.1 The Problems

- Is there an adequate estimate of floors, walls and ceilings within the interior/exterior of buildings?

- Is the nature and extent of radiological contamination adequately characterized so that remaining floors, walls and ceiling can be released as sanitary waste?

5.3.2 The Decisions

- Is there an inventory/estimate of floors, walls and ceilings within the interior/exterior of building(s)?

- Are there sufficient radiological surveys/samples to release all remaining floors, walls and ceilings as sanitary waste?

5.3.3 Inputs to the Decision

- Assess magnitude and location of data from preceding characterizations, including data contained in the RLCR, IM/IRA, DOP and IPC.

- Identify applicable action levels, free release criteria, transportation requirements, waste management regulations, pollution prevention/waste minimization criteria, and the disposal facilities' WAC.

5.3.4 Decision Boundaries

- Identify spatial confines of building, including room, sets of rooms or facility in 2 and 3 dimensions.

- Identify temporal aspects of the project.

5.3.5 Decision Rules

- For remaining floors, walls and ceilings:

    1. If all radiological survey measurements are below the surface contamination thresholds provided in DOE Order 5400.5, the related area or volume of material is considered sanitary waste or may be free-released.

    2. If all radiological sample measurements are below the volume contamination thresholds provided in the No-Rad-Added Verification (NRA) Program, the related volume of material is considered sanitary waste or may be free released.

    3. If any radiological survey measurement exceeds the surface contamination thresholds provided in DOE Order 5400.5, the related area of material must be dispositioned per Section 5.2 and resurveyed per Section 5.3.

    4. If any radiological sample measurement exceeds the volume contamination threshold provided in the NRA Program, the related volume of material must be dispositioned per Section 5.2 and resurveyed per Section 5.3..

5.3.6 Tolerable Limits on Decision Error

- The maximum value for false positive and false negative errors is 5% when calculating the number of samples required.

5.3.7 Optimization of Plan Design

- A statistically based radiological survey/sampling plan **SHALL** be developed per the requirements in Section 5.5 of MARSSIM.

- The location of radiological survey/sampling points **SHALL** be delineated per the requirements in Section 5.5 of MARSSIM.

- Radiological field measurement methods and instrumentation **SHALL** be delineated per the requirements in Section 6 of MARSSIM.

- Radiological sampling and preparation for laboratory measurements **SHALL** be delineated per the requirements in Section 7 of MARSSIM.

5.4 DOCUMENTATION REQUIREMENTS

Two of the three characterization phases for Type 2 and Type 3 facilities require the following documentation: the RCLP, the RLCR, the FSSP, and the FSSR. No formal plan is required for IPC. Applicable results are documented in the FSSP and the FSSR.

5.4.1 RLCP

A detailed RLCP **SHALL** be prepared that describes the reconnaissance necessary to fully characterize a specific building, including building conditions, type and extent of contamination, and wastes. Such a plan **SHALL** address the DQOs identified in Section 5.1. The Plan **SHALL** also specify quality assurance (QA) requirements or a project-specific QA Plan (QAP) should be prepared. **An annotated outline for the RLCP is presented in the Appendix C.**

Development of the Plan **SHALL** involve reviewing information and data from previous characterizations and identifying data gaps based on the DQO problems and decisions (see Section 5.1.3, Inputs to the Decision). The focus of the RLC is to fill the data gaps. Based on data gaps and building-specific information (e.g., surface areas of floors, walls and ceilings), the Project Manager **SHALL** specify the types, numbers and location of samples and measurements; detection limits; error tolerances; and QA/QC requirements.

The Plan should include table(s) to present input data, such as Contaminants Of Concern, existing data on Contaminants Of Concern, related action levels and free-release criteria (i.e., DQO decision rules), WAC for Contaminants Of Concern-containing material, transportation requirements, number and location of samples, required sampling and analysis methods and references, number of QA/QC samples, detection limits, and location of other hazards.

Characterization should be achieved through selection and implementation of the appropriate combination of direct measurement, sample collection and laboratory analysis, physical observation, prior characterization and process knowledge. The gross presence and location of loose and fixed radiological contamination should be identified. Past chemical spills and existing hazards also should be characterized. In addition, characterization should include identification of radioactive and hazardous materials, including any quantities of residual SNM, beryllium, PCB and ACM, lead- and PCB-based paints, and radioactive and hazardous wastes.

The management and characterization of RCRA units should also be addressed. Units can either be closed as part of deactivation, or rendered RCRA-stable and closed under the D&D program. If a unit is to be closed as part of deactivation, closure activities, including characterization, should be described in a closure description document and approved by CDPHE under CHWA.

Characterization results **SHALL** be used to re-evaluate the facility type and the disposition decision. Results should be used to prepare the CERCLA decision document, including alternatives development and analysis, health and safety analysis, determination of engineering support requirements, and determination of appropriate schedules. Results should provide adequate detail to allow DOE to make a determination if the facility has significant contamination or hazards as described in Section 9 of the RFCA and to confirm the hazard categorization of the facility.

5.4.2 RLCR

The documentation of RLC results is a RFCA-mandated report. This report **SHALL** provide an analysis of the characterization results and summarize the hazards and risks associated with the facility, including the nature and extent of radiological and chemical contamination and the types and volumes of wastes to be managed. Specifics should address the type and extent of strip-out and decontamination necessary, estimates on the types and volumes of waste anticipated, and controls needed for strip-out and decontamination, including personal protection equipment (PPE) and environmental controls. Compliance with data review requirements **SHALL** also be documented, as described in Section 7. The report should provide information in adequate detail to allow DOE to make a determination if the facility has significant contamination or hazards, as described in Attachment 9 of the RFCA. DOE will use the information from the report to confirm its categorization of the facility, and will transmit the report and a notification letter to the Lead Regulatory Agency for concurrence. The notification letter will include DOE's determination as to the facility type. Refer to Section 3.4.4 of the DPP for more detail on the process. **An annotated outline for the RLCR is presented in Appendix C.**

Final reports containing survey/sample results **SHALL** describe the results of QC measurements, audits, and confirmation sample comparisons performed for each sampling and analysis task per the D&D QA Program Plan (QAPP). Quality problems associated with performance of methods, completeness of data, comparability of data including field and confirmatory data, and data storage **SHALL** be documented with the corrective actions that have been taken to correct the deficiencies identified (pursuant to Analytical Services Division QA documentation). Refer to Section 7.0 which discusses the data review requirements.

5.4.3 FSSP

A detailed FSSP **SHALL** be prepared to determine the nature and extent of radiological and chemical contamination after strip-out and decontamination. Survey results **SHALL** be used to re-evaluate final disposition alternatives and to plan for demolition if demolition is the selected disposition alternative. Such a plan **SHALL** address the DQOs, including the problems and decisions, contained in Section 5.3. The Plan should also address quality assurance requirements, or a project specific QA Plan should be prepared. **An annotated outline for the Final Status Survey Plan is presented in Appendix C.**

Development of the Plan **SHALL** involve reviewing information and data from reconnaissance and in-process characterizations and identifying data gaps based on the DQO problems and decisions (see Section 5.3, Inputs to the Decision). Based on data gaps and building-specific information (e.g., surface areas of floors, walls and ceilings), the Plan **SHALL** specify the types, numbers and location of samples and measurements; detection limits; error tolerances; and QA/QC requirements. The Plan should include table(s) to present input data, such as Contaminants of Concern, existing data on Contaminants of Concern, related action levels and free-release criteria (i.e., DQO decision rules), the WAC for Contaminants of Concern-

containing material, number and location of samples, required sampling and analysis methods and references, number of QA/QC samples, detection limits, and location of other hazards.

Characterization **SHALL** be achieved through selection and implementation of the appropriate combination of direct measurement and sample collection and laboratory analysis. Any remaining loose and fixed radiological contamination **SHALL** be identified. Areas of past chemical storage, use and spills also **SHALL** be checked for contamination. Results **SHALL** be used to estimate the types and volumes of waste anticipated, and controls needed for demolition.

5.4.4 FSSR

The documentation of FSS results is a RFCA-mandated report. This report **SHALL** provide data on the nature and extent of radiological and chemical contamination after strip-out and decontamination. Compliance with data review requirements **SHALL** be documented, as described in Section 7. This report **SHALL** validate the premise that the building may be free-released as sanitary waste or material for recycle. **An annotated outline for the Final Status Survey Report is presented in Appendix C.**

Final reports containing survey results should describe the results of QC measurements, performance audits, and systems audits, and confirmation sample comparisons performed for each sampling and analysis task. Quality problems associated with performance of methods, completeness of data, comparability of data including field and confirmatory data, and data storage **SHALL** be documented with the corrective actions that have been taken to correct the deficiencies identified. Refer to Section 7.0, which discusses data review requirements.

6.0 SAMPLING AND ANALYSIS

The DQO process will identify sampling and analysis needs. For example, if historical data or process knowledge is not available to make a D&D decision, sampling and analysis **SHALL** be required. This section describes the minimum sampling requirements for the non-radioactive Contaminants Of Concern (i.e., asbestos, PCBs, and RCRA constituents), as well as the methods required to determine chemistry of the samples. These methods **SHALL** be implemented following determination of the project-specific DQOs. This section does not address radiological swipes and sampling, radiological field measurement methods and instrumentation, and radiological sampling and preparation for laboratory measurement (refer to MARISSIM Sections 5.0, 6.0, and 7.0 respectively).

A general note applicable to Contaminants of Concern, radioactive and non-radioactive, is as follows: if process or historical knowledge suggests that a medium is contaminated and the project assumes the associated risk of false positive results, the medium may be categorized as contaminated without further sampling prior to remedial actions. This rationale allows potential cost-savings relative to sampling and analysis, but has the associated risk of excess costs that result with managing hazardous/radioactive waste (when the waste is actually non-hazardous nor non-radioactive). Confidence in such a decision resides in the quality of the process and/or historical knowledge. In addition, the decision must be considered in light of waste minimization requirements contained in 6 CCR 1007-3 and DOE Order 5820.2A.

Samples **SHALL** be collected and submitted for analysis in bulk form pursuant to applicable regulations (i.e., in a form and cumulative composition most representative of the anticipated form of the waste stream). For example, samples of paints from walls constructed with cinder

blocks should contain both the superficial paint layer(s) and a portion of the associated cinder block wall. Also, a minimum of 100 and maximum of 200 grams (g) of bulk sample is required for performance of the Toxicity Characteristic Leaching Procedure (TCLP) procedure.

6.1 ASBESTOS

Surface materials and thermal insulation materials, potentially containing asbestos, **SHALL** be sampled for asbestos per 40 CFR 763.86 and 5 CCR 1001-10 by a Certified Asbestos Inspector. A minimum of three samples are required per homogeneous area greater than six linear feet (ft) and <1,000 ft^2 in dimension; one sample is required for areas <six linear ft in dimension. Five samples are required per homogeneous areas between 1,000 ft^2 and 5,000 ft^2. Where homogeneous areas of >5000 ft^2 are encountered, seven samples are required. Samples are randomly selected from the centers of a square grid proportional to the size of the area. Grid spacing is only required for friable surfacing materials which may include drywall joint compound if suspected by the inspector.

The generic categories of materials to be sampled are listed below:

- Thermal systems (e.g., pipe insulation);
- Surfacing materials (e.g., fireproofing, ceiling texture); and
- Miscellaneous (e.g., floor tiles, ceiling panels, concrete foundations and walls).

The presence of friable asbestos (i.e., >1% by volume) **SHALL** be determined at a laboratory with asbestos accreditation (AIHA and NVLAP). The correct asbestos characterization method is EPA 600/R-93/116. Based on the sampling results and the bulk materials represented by the samples, the quantities of friable and nonverbal ACM **SHALL** be estimated for subsequent abatement and waste management purposes.

6.2 POLYCHLORINATED BIPHENYLS (PCBs)

Sampling and analysis to verify PCB spill clean-up **SHALL** comply with 40 CFR 761.123 and 761.125 or 40 CFR 761.130. Compliance with 40 CFR 761 130 **SHALL** be attained through the following criteria:

- A sampling area that is equal to the original spill area plus 20% or an additional one-foot boundary;
- 95% confidence limit (against false positives); and
- A minimum of three samples taken via the Midwest Research Institute (MRI) method (EPA, 1986), which implements a hexagonal grid sampling design.

The analytical method **SHALL** have a practical quantitation limit (PQL) of less than 50% the regulatory threshold of 50 ppm. The SW-846 analytical method, 4020 (portable field kit) or 8082 (off-site analysis in a fixed lab), are recommended.

6.3 RCRA CONSTITUENTS

Media potentially contaminated with RCRA constituents **SHALL** be characterized using process knowledge and/or analyzed for compounds and elements in accordance with 6 CCR 1007-3, Part 261, and 40 CFR 268. Analytical methods **SHALL** have PQLs at levels better than 50% of the regulatory thresholds:

The following SW-846 methods or equivalent industry-proven methods **SHALL** be used for analyses or other equivalent methods as specified in the applicable Waste Acceptance Criteria (WAC):

- Metals (incl. Be) 6010B
- Mercury 7470A (liquid)
  7471A (solids)
- Semi-volatiles 8270C
- Volatiles 8260B

- Pesticides 8081A
- Herbicides 8151A
- Ignitability 1010 or 1020A (liquids)
  1030 (solids)
- Corrosivity 1110 or 1120
- Reactivity HCN Test Method or H_2S Test Method

Both total analysis and the TCLP can be used to characterize solid samples. If total analysis is used, results **SHALL** be divided by 20 before comparison with the Table 6-1 regulatory thresholds. If TCLP is used, the SW-1311 preparation method **SHALL** be used. The Paint Filter Test, SW-9095A, **SHALL** be used for sludge for determining whether liquid or solid units shall be reported.

All samples from painted surfaces (non-asbestos samples) acquired for lab analysis **SHALL** be acquired by ASTM Method E 1729-95, Standard Practice for Field Collection of Dried Paint Samples for Lead Determination by Atomic Spectrometry Techniques.

Table 6-1 Maximum Concentration of Contaminants for the Toxicity Characteristic

EPA HW No. \ 1\	Contaminant	CAS No. \2\	Regulatory Level (mg/L)
D004	Arsenic	7440-38-2	5.0
D005	Barium	7440-39-3	100.0
D018	Benzene	71-43-2	0.5
D006	Cadmium	7440-43-9	1.0
D019	Carbon Tetrachloride	56-23-5	0.5
D020	Chlordane	57-74-9	0.03
D021	Chlorobenzene	108-90-7	100.0
D022	Chloroform	67-66-3	6.0
D007	Chromium	7440-47-3	5.0
D023	o-Cresol	95-48-7	\4\ 200.0
D024	m-Cresol	108-39-4	\4\ 200.0
D025	p-Cresol	106-44-5	\4\ 200.0
D026	Cresol		\4\ 200.0
D016	2,4-D	94-75-7	10.0
D027	1, 4-Dichlorobenzene	106-46-7	7.5
D028	1, 2-Dichloroethane	107-06-2	0.5
D029	1, 1-Dichloroethylene	75-35-4	0.7
D030	2, 4-Dinitrotoluene	121-14-2	\3\ 0.13
D012	Endrin	72-20-8	0.02
D031	Heptachlor (and its epoxide)	76-44-8	0.008
D032	Hexachlorobenzene	118-74-1	\3\ 0.13
D033	Hexachlorobutadiene	87-68-3	0.5
D034	Hexachloroethane	67-72-1	3.0
D008	Lead	7439-92-1	5.0
D013	Lindane	58-89-9	0.4
D009	Mercury	7439-97-6	0.2
D014	Methoxychlor	72-43-5	10.0
D035	Methyl ethyl ketone	78-93-3	200.0
D036	Nitrobenzene	98-95-3	2.0
D037	Pentachlorophenol	87-86-5	100.0
D038	Pyridine	110-86-1	\3\ 5.0
D010	Selenium	7782-49-2	1.0
D011	Silver	7440-22-4	5.0
D039	Tetrachloroethylene	127-18-4	0.7
D015	Toxaphene	8001-35-2	0.5
D040	Trichloroethylene	79-01-6	0.5
D041	2, 4, 5-Trichlorophenol	95-95-4	400.0
D042	2, 4, 6-Trichlorophenol	88-06-2	2.0
D017	2, 4, 5-TP (Silvex)	93-72-1	1.0
D043	Vinyl chloride	75-01-4	0.2

\1\ Hazardous waste number.

\2\ Chemical Abstracts Service (CAS) number.

\3\ Quantitation limit is greater than the calculated regulatory level. The quantitation limit therefore Becomes the regulatory level.

\4\ If -, m- and p-Cresol concentrations cannot be differentiated, the total cresol (D-026) concentration is used. The regulatory level of total cresol is 200 mg/l.

SOURCE: 6CCR 1007-3, Part 261, and 40 CFR 268

7.0 DATA REVIEWS

As stated in Sections 4.2 and 5.2, in order to meet QA requirements of the D&D Program, data collected during characterization **SHALL** be reviewed prior to incorporation into final reports to determine usability and compliance with RFCA and minimum quality requirements. In general, reviews include data verification and validation (V&V); precision, accuracy, representatives, completeness and comparability (PARCC) evaluations and DQA. Radiological data collected during the reconnaissance level and in-process phase **SHALL** be reviewed according to the Radiological Control Manual and established Radiological Safety Practices Procedures. Radiological data gathered during final status surveys **SHALL** be reviewed according to MARSSIM. The review process is described below.

7.1 DATA VERIFICATION AND VALIDATION (V&V)

Verification **SHALL** be performed on sets of data produced by the project on which decisions are based. Validation **SHALL** be performed on minimum percentages of data/data packages as stipulated in project-specific sampling and analysis plans. Analytical data **SHALL** be verified and validated according to RFETS Analytical Services Division guidelines (General Guidelines for Data Verification and Validation, DA-GR01-V1).

Project managers **SHALL** plan for V&V accordingly (i.e., ensure adequate funding, schedule, and personnel to achieve data quality requirements as the project progresses); comprehensive V&V immediately before final reporting is typically too late to allow for data disparity corrective actions. Budgeting is typically based on the estimated number of samples/analyses planned for the project, and is some percentage of the cost per survey of analysis.

Data verification ensures that the requirements stated in characterization plans were implemented as prescribed in project-specific sampling and analysis plans. For example, verification ensures that requirements relative to the data produced by the project are satisfactory with respect to quantity, types, and format of data specified in the applicable planning documents (e.g., electronic data deliverables (EDDs), data packages (hardcopies), reports, data forms, etc.). The attached checklist (Table 7-1) identifies the type of D&D verification that must be performed. Additional line items **SHALL** be incorporated on a project-by-project basis, relative to project-specific data requirements and those requirements identified by the Analytical Services Division. In addition, every D&D report **SHALL** also present, as appendices, attachments, concise reference, etc., the entire data set used for decisions as defined in the DQO section. The attached data become a critical part of the CERCLA Administrative Record, which further verifies the D&D measurements of interest. A section of the report **SHALL** explain the steps and criteria used for data verification and validation including qualified and rejected data, and a summary table of all methods used, real samples, and QC samples. All data (100%) **SHALL** be verified.

In contrast to data verification, data validation is an in-depth technical review of the data (or a representative percentage of the data) that determines whether characterization was performed within quality control requirements and tolerances. Depending on the project and the critical nature of samples, a percentage of the entire data may be validated, so long as the percentage is representative.

For example, validation percentages must include the following:

- each laboratory;
- each subcontractor;
- each medium (matrix or material type); and
- each method (e.g., SW-846 or radiochemical).

A validation rate of greater than/equal to 25% is currently used at the RFETS, based on acceptance (via approved work plans) by EPA Region VIII and CDPHE. A lower rate may become acceptable to the agencies, however, depending on the number of critical samples or surveys for a given project, higher frequencies of validation may be desired for higher confidence. MARSSIM Appendix N also provides guidance for data validation.

Table 7-1 Data Verification Checklist

	Caveat?	Compliance? Yes	No
1. DATA PACKAGE & SAMPLE RESULTS			
a) Package(s) is intact and meets project-specific requirements (hard-copy and electronic data deliverable [EDD])			
b) Chain-of-Custody forms were completed and authenticated; all original sample IDs are traceable to final results			
c) Sample turnaround, holding times, & preservation requirements were met			
d) Specified parameters were captured per DQOs			
e) Results reported for each requested analyte/radionuclide			
f) Results with appropriate significant figures			
g) Final results are traceable to locations			
2. QC SAMPLE RESULTS SUMMARY			
a) Sensitivity of methods adequate (i.e., practical quantitation limits $\leq$ 50% action levels			
b) PARCC parameters achieved relative to project-specific DQOs			

Respond to each checklist item in the "Caveat?" column with a footnote as applicable and provide the caveat in the Footnotes section below.

FOOTNOTES:

I certify that all responses to this checklist accurately reflect the completeness and quality aspects of this sample data package. Furthermore, I understand that inaccuracies in the completion of this checklist will be considered a nonconformance to Subcontract Requirements as evidenced by the following signature of the laboratory manager or designee.

Print/Typed Name: _____ Title: _____

Signature _____ Date _____

7.2 PARCC EVALUATIONS

Following V&V, the data set **SHALL** be evaluated relative to the PARCC parameters (i.e., precision, accuracy, representativeness, completeness and comparability). PARCC parameters **SHALL** be assessed and summarized to ensure compliance with minimum quality requirements (see the D&D QAPP), and communication of compliance (and any exceptions) to the regulators and stakeholders. The basis for assessing each of these elements of data quality is discussed in the following subsections.

7.2.1 Precision

Precision measures the reproducibility of measurements. It is strictly defined as the degree of mutual agreement among independent measurements as the result of repeated application of the same process under similar conditions. Analytical precision is the measurement of the variability associated with duplicate (two) or replicate (more than two) analyses. D&D QA **SHALL** use the laboratory control sample duplicate (LCSD) to determine the precision of the analytical method. If the recoveries of analytes in the LCSD are within established control limits, then precision is within limits. Total precision is the measurement of the variability associated with the entire sampling and analysis process. It is determined by analysis of duplicate or replicate field samples and measures variability introduced by both the laboratory and field operations. Field duplicate samples and matrix duplicate spiked samples **SHALL** be analyzed to assess project and lab analytical precision, respectively, and the precision measurement **SHALL** be determined using the relative percent difference between the sample results.

7.2.2 Accuracy

Accuracy is a statistical measurement of correctness and includes components of random uncertainty (variability due to imprecision) and systemic error. It therefore reflects the total uncertainty associated with a measurement. A measurement is accurate when the value reported does not differ from the true value or known concentration of the spike or standard. Analytical accuracy **SHALL** be measured by comparing the percent recovery of analytes spiked into an LCSD to a control limit. For volatile and semivolatile organic compounds, surrogate compound recoveries **SHALL** also be used to assess accuracy and method performance for each sample analyzed. Analysis of performance evaluation (PE) samples shall also be used to provide additional information for assessing the accuracy of the analytical data being produced. Both accuracy and precision **SHALL** be calculated for each D&D QA analytical batch, and the associated sample results **SHALL** be interpreted by considering these specific measurements.

7.2.3 Representativeness

Objectives for representativeness are defined for each sampling and analysis task and are a function of the investigative objectives. Representativeness **SHALL** be achieved through use of the standard field, sampling, and analytical procedures. Representativeness **SHALL** also be determined by appropriate program design, with consideration of elements such as sample locations, matrix and sample type.

7.2.4 Completeness

Completeness **SHALL** be calculated for the aggregation of data for each analyte measured for any particular sampling event or other defined set of samples. Completeness **SHALL** be calculated and reported for each method, matrix and analyte combination. The number of valid results divided by the number of possible individual analyte results, expressed as a percentage, **SHALL** determines the completeness of the data set. For completeness requirements, valid results **SHALL** be all results not rejected (due to inadequate quality control). The requirement for completeness **SHALL** be 95 percent for aqueous samples and 90 percent for solid samples. For any instances of samples that could not be analyzed for any reason (e.g., holding time violations in which re-sampling and analysis were not possible, samples spilled or broken, etc.), the numerator of this calculation **SHALL** become the number of valid results minus the number of possible results not reported. The formula for calculation of completeness is presented below:

$$\% \text{ completeness} = \frac{\text{number of valid results}}{\text{number of possible results}} \times 100$$

7.2.5 Comparability

Comparability is the confidence with which one data set can be compared to another data set. One of the objectives of characterization is to produce data with the greatest possible degree of comparability. The number of matrices that are sampled and the range of field conditions encountered are considered in determining comparability. Comparability **SHALL** be achieved by using standard methods for sampling and analysis, reporting data in standard units, normalizing results to standard conditions and using standard and comprehensive reporting formats. Complete field documentation using standardized data collection forms **SHALL** support the assessment of comparability. Analysis of PE samples and reports from audits **SHALL** also be used to provide additional information for assessing the comparability of analytical data produced among subcontracting laboratories. Historical comparability **SHALL** be achieved through consistent use of methods and documentation procedures throughout the project.

7.3 DATA QUALITY ASSESSMENT (DQA)

DQA is a scientific and statistical evaluation that determines if the data are of the right type, quality, and quantity to support their intended use, which is to make decisions regarding D&D. The decisions and the decision-rules are defined within the DQO framework. Although some data assessment may be performed before or in-parallel with data V&V (i.e., confirmation), the DQA **SHALL** not be final until V&V are complete. This restriction is necessary since the data assessment assumes that the individual data constituting statistics and parameters are satisfactory for their intended purpose and based on quality requirements. Data quality is not assumed, but measured.

The DQA process, as defined by EPA QA/G-9 (EPA, 1996) and MARSSIM (NUREG-1575) constitutes the guidance for assessing the quality of data. MARSSIM addresses DQA in Section 8.0 and more specifically in Table 2.3 and Appendices E & I. The assessment **SHALL** include evaluating sample quantities, and sources and magnitudes of uncertainty relative to tolerances allowed in planning documentation, including both systematic and random sources of error. The G-9 process consists of five steps:

1. Review the DQOs;
2. Conduct a preliminary Data Review;
3. Select a Statistical Test;
4. Verify the Assumptions of the Statistical Test; and
5. Draw Conclusions from the Data.

8.0 DISPOSITION OF RECORDS

The following documents are quality assurance and CERCLA Administrative Records and **SHALL** be maintained in accordance with 1-V41-RM-001, Records Management Guidance for Records Sources and 1-F78-ER-ARP, CERCLA Administrative Record Program: RLCP, RLCR, FSSP, FSSR, IPC for radionuclides, and the data Verification Checklist.

9.0 REFERENCES

EPA, 1994. U.S. Environmental Protection Agency. Guidance for the Data Quality Objectives Process, QA/G-4, September 1994 (EPA/600/R-96/055).

DOE, 1992. U.S. Department of Energy. Manual for Conducting Radiological Surveys in Support of License Termination, June 1992 (DOE/EMO142P).

DOE, 1995. U.S. Department of Energy. Decommissioning Resource Handbook, (DOE/EM), August 1995.

EPA, 1986. U.S. Environmental Protection Agency. Field Manual for Grid Sampling of PCB Spill Sites to Verify Cleanup, (EPA-560/5-86-017).

DOE/RFFO, CDPHE, EPA. Final Rocky Flats Cleanup Agreement (RFCA), July 19, 1996.

Department of Defense, Department of Energy and Nuclear Regulatory Commission. Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), December 1997 (NUREG 1575, EPA 402-R-97-016).

EG&G Rocky Flats, 1993. No-Radioactivity-Added (NRA) Waste Verification Program, September 1993.

DOE, 1996. U.S. Department of Energy. Statistical and Cost Benefit Enhancements for the DQO Process for Characterization Decisions, September 12, 1996 (DOE/EM-0316)

Appendix A

The RFETS Characterization Process

Appendix B

The D&D Characterization Process Logic Diagram

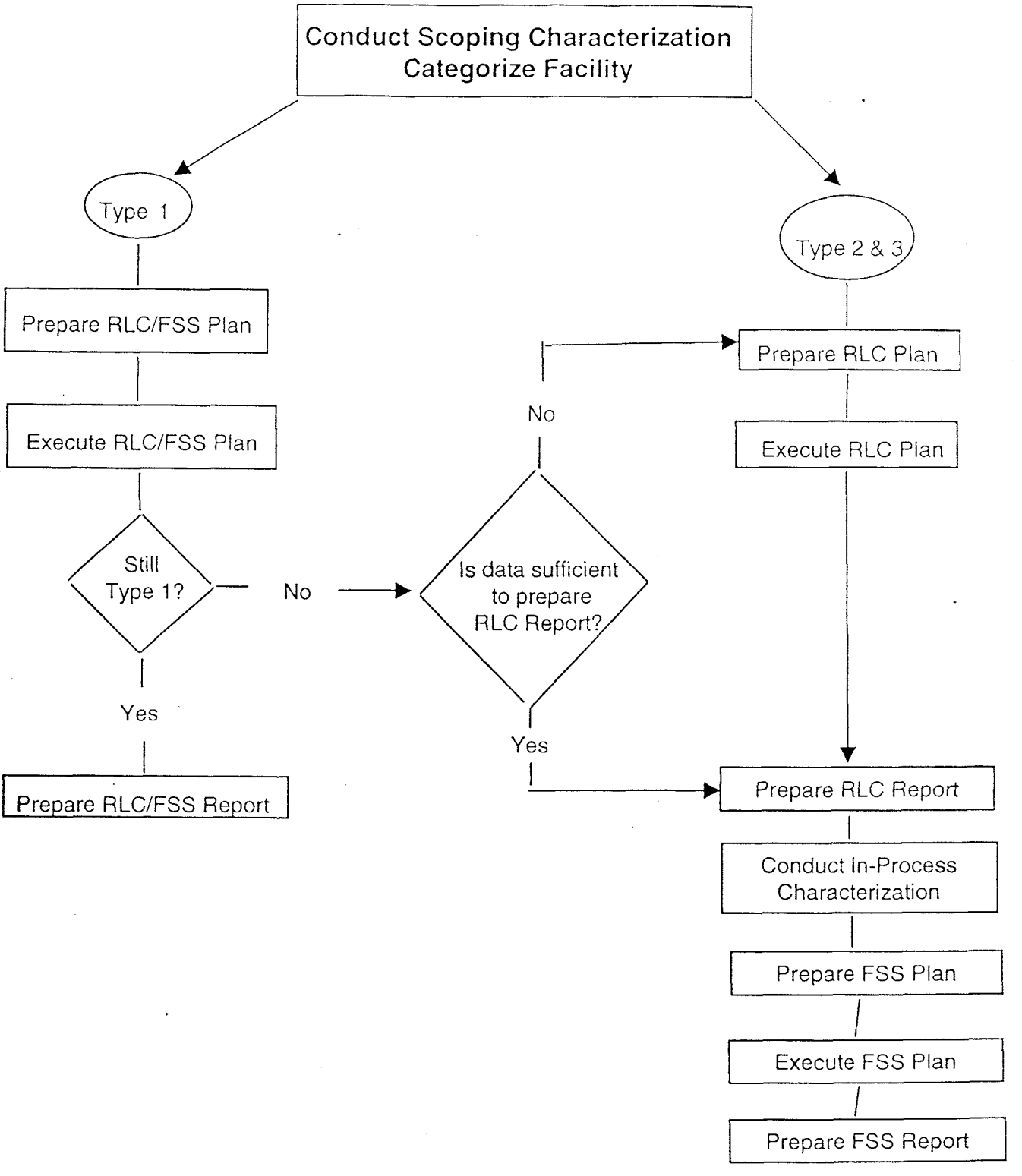
Appendix C

Annotated Outlines of Plans and Reports

Appendix A

The RFETS Characterization Process

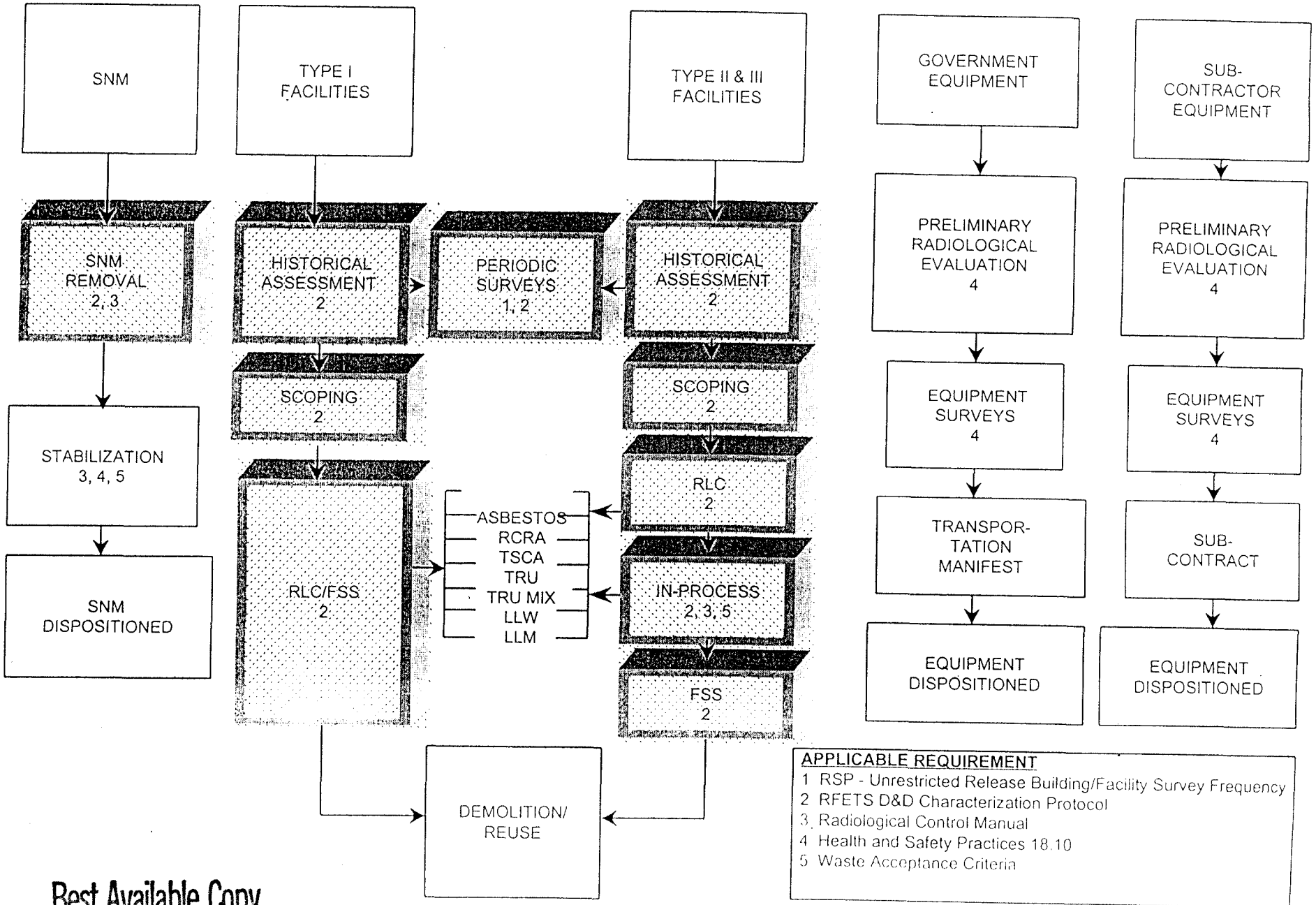
D&D Characterization Process Logic Diagram



Appendix B

The D&D Characterization Process Logic Diagram

THE RFETS CHARACTERIZATION PROCESS



Appendix C

Annotated Outlines of Plans and Reports

RECONNAISSANCE-LEVEL CHARACTERIZATION / FINAL STATUS SURVEY PLAN

INTRODUCTION

Purpose
Scope
Data Life Cycle (see B123 plan)

BUILDING / CLUSTER DESCRIPTION

Include physical description, operating history and general building conditions.

Identify any known hazards.

Discuss existing data from historical site assessments, scoping characterization, etc.

Present data gaps.

Demonstrate why building/cluster is believed to be a Type I Facility.

DATA QUALITY OBJECTIVES

Present DQOs from the Characterization Manual; adjust accordingly

The Problem
The Decision
Inputs to the Decision
The Project Boundaries
Decision Rules
Limits on Decision Errors
Optimizing the Design for Obtaining Data

SURVEYING, SAMPLE COLLECTION AND ANALYSIS

- Discuss sampling and field measurement/surveying methods and procedures per contaminant type, including radiological contamination.
- Specify number of samples, sample locations, sample and survey grids, analytes, etc.
- Specify equipment and instruments to be used, and required detection limits.
- Include subsections on sample handling procedures, QC samples, sample designation, personnel and equipment decontamination, and waste management.
- Discuss laboratory analysis (who, how, procedures, QA/QC, etc.)

HEALTH AND SAFETY

- Discuss how characterization/survey activities implement the RFETS ISM Program.
- Discuss PPE based on building and COCs (hazards identification).

- Discuss contamination and other controls (Rad and Non-Rad), including RWPs, CAs and CRZs, postings, personnel and area monitoring, decontamination, etc., based on hazards identification.

- Discuss ongoing data review used to assess adequacy of controls and implementation of any control changes .

QUALITY ASSURANCE

Applicable QA Programs
Personnel Training and Qualification
Document Control and Records / Data Management
Change Control
Procurement
Inspection and Acceptance Testing
Assessments and Continuous Improvement

PROJECT ORGANIZATION (Roles and Responsibilities)

REFERENCES

APPENDICES

Radiological Survey Instructions
Applicable Decommissioning Characterization Protocols and Procedures
Others As Appropriate

RECONNAISSANCE-LEVEL CHARACTERIZATION / FINAL STATUS SURVEY REPORT

EXECUTIVE SUMMARY

INTRODUCTION

- Report Purpose
- Characterization/Survey Scope
- Report Content

SUMMARY OF CHARACTERIZATION/SURVEY ACTIVITIES

- Data Quality Objectives (including the Problem and Decisions)
- Sampling and Field Measurement/Surveying Methods, Procedures and Equipment
- Laboratory Analysis

BUILDING / CLUSTER OPERATING HISTORY

- History of Buildings
  - Include Releases and Fires
- Current Operations
- RCRA and CERCLA Designated Areas

PHYSICAL DESCRIPTION

- Summary Description
- Specific Descriptions
  - Foundations
  - Structural Framing
  - Exterior Walls
  - Floors
  - Interior Walls
  - Ceilings
  - Doors
  - Windows
  - Surface Finishes
  - Stacks and Vents
  - Utilities, including electrical, potable water, fire water, gas, etc.
  - Process and Waste Lines, including industrial and sanitary systems

IDENTIFIED BUILDING HAZARDS

- Physical
- Radiological
- Chemical
  - Lead
  - Beryllium
  - Other Metals
  - PCBs

- Chlorinated Solvents
- Other Organics
- Others

Asbestos
Pressurized Gas and Liquid Nitrogen
Electrical
Wastes

- Hazardous Waste
- LLW and LLMW
- TRU and TRU Mixed Waste
- Asbestos Waste
- PCB Waste
- Non-Rad / Non-Haz

Other

DECOMMISSIONING WASTE TYPES AND VOLUME ESTIMATES

DATA CONFIRMATION AND DATA QUALITY ASSESSMENT

FINAL BUILDING / CLUSTER CATEGORIZATION (TYPE) AND NEXT STEPS IN THE DECOMMISSIONING PROCESS

Discuss building categorization based on characterization/survey results in terms of the DQO ìProblemî and ìDecisionsî.

REFERENCES

APPENDICES

RECONNAISSANCE-LEVEL CHARACTERIZATION PLAN

INTRODUCTION

Purpose
Scope
Data Life Cycle (see B123 plan)

BUILDING / CLUSTER DESCRIPTION

- Include physical description, operating history, and general building conditions
- Discuss presence of radiological materials and chemical products
- Discuss existing radiological and chemical contamination data
- Discuss known radiological, chemical and physical hazards
- Present data gaps

DATA QUALITY OBJECTIVES

Present DQOs from the Characterization Manual; adjust accordingly

The Problem
The Decision
Inputs to the Decision
The Project Boundaries
Decision Rules
Limits on Decision Errors
Optimizing the Design for Obtaining Data

SAMPLE COLLECTION AND ANALYSIS

- Discuss sampling and field measurement/survey methods and procedures per contaminant type, including radiological contamination.
- Specify number of samples, sample locations, sample and survey grids, analytes, etc.
- Specify equipment and instruments to be used, and required detection limits.
- Include subsections on sample handling procedures, QC samples, sample designation, personnel and equipment decontamination, and waste management.
- Discuss laboratory analysis (who, how, procedures, QA/QC, etc.).

HEALTH AND SAFETY

- Discuss how characterization activities implement the RFETS ISM Program.
- Discuss PPE based on building and COCs (hazards identification).

- Discuss contamination and other controls (Rad and Non-Rad), including RWPs, CAs and CRZs, postings, personnel and area monitoring, decontamination, etc., based on hazards.

- Discuss ongoing data review used to assess adequacy of controls and implementation of any control changes needed.

QUALITY ASSURANCE

Applicable QA Programs
Personnel Training and Qualification
Document Control and Records / Data Management
Change Control
Procurement
Inspection and Acceptance Testing
Assessments and Continuous Improvement

PROJECT ORGANIZATION (Roles and Responsibilities)

REFERENCES

APPENDICES

Radiological Survey Instructions
Applicable Decommissioning Characterization Protocols and Procedures
Others As Appropriate

RECONNAISSANCE-LEVEL CHARACTERIZATION REPORT

EXECUTIVE SUMMARY

INTRODUCTION

- Report Purpose
- Characterization Scope
- Report Content

SUMMARY OF CHARACTERIZATION ACTIVITIES

- Data Quality Objectives Used
- Sampling and Field Measurement Methods, Procedures and Equipment
- Laboratory Analysis

BUILDING / CLUSTER OPERATING HISTORY

- History of Buildings
  - Include Releases and Fires

- Current Operations
- RCRA and CERCLA Designated Areas

PHYSICAL DESCRIPTION

- Summary Description
- Specific Descriptions

  - Foundations
  - Structural Framing
  - Exterior Walls
  - Floors
  - Interior Walls
  - Ceilings
  - Doors
  - Windows
  - Surface Finishes
  - Stacks and Vents
  - Utilities, including electrical, potable water, fire water, gas, etc.
  - Process and Waste Lines, including industrial and sanitary systems

IDENTIFIED BUILDING HAZARDS

- Physical
- Radiological
- Chemical
  - Lead
  - Beryllium
  - Other Metals

- PCBs
- Chlorinated Solvents
- Other Organics
- Others

Asbestos
Pressurized Gas and Liquid Nitrogen
Electrical
Wastes

- Hazardous Waste
- LLW and LLMW
- TRU and TRU Mixed Waste
- Asbestos Waste
- PCB Waste
- Non-Rad / Non-Haz

Other

DECOMMISSIONING WASTE TYPES AND VOLUME ESTIMATES

DATA QUALITY ASSESSMENT

ANALYSIS AND INTERPRETATION OF RESULTS

Discuss results in terms of decision rules and final disposition
Discuss any decision limitations

REFERENCES

APPENDICES

FINAL STATUS SURVEY PLAN

INTRODUCTION

Purpose
Survey Scope
Data Life Cycle (see B123 plan)

BUILDING / CLUSTER DESCRIPTION

Summarize physical description, operating history, and general building conditions
Summarize RLC findings, including nature and extent of contamination
Summarize strip-out and decontamination activities
Present data from in-process characterization

DATA QUALITY OBJECTIVES

Present DQOs from the Characterization Manual; adjust accordingly

The Problem
The Decision
Inputs to the Decision
The Project Boundaries
Decision Rules
Limits on Decision Errors
Optimizing the Design for Obtaining Data

SAMPLE COLLECTION AND ANALYSIS

- Discuss sampling and field measurement/survey methods and procedures per contaminant type, including radiological contamination.
- Specify number of samples, sample locations, sample and survey grids, analytes, etc.
- Specify equipment and instruments to be used, and required detection limits.
- Include subsections on sample handling procedures, QC samples, sample designation, personnel and equipment decontamination, and waste management.
- Discuss laboratory analysis (who, how, procedures, QA/QC, etc.).

HEALTH AND SAFETY

- Discuss how survey activities implement the RFETS ISM Program.
- Discuss PPE based on building and COCs (hazards identification.
- Discuss contamination and other controls (Rad and Non-Rad), including RWPs, CAs and CRZs, postings, personnel and area monitoring, decontamination, etc., based on hazards.

- Discuss ongoing data review used to assess adequacy of controls and implementation of any control changes needed.

QUALITY ASSURANCE

Applicable QA Programs
Personnel Training and Qualification
Document Control and Records / Data Management
Change Control
Procurement
Inspection and Acceptance Testing
Assessments and Continuous Improvement

PROJECT ORGANIZATION (Roles and Responsibilities)

REFERENCES

APPENDICES

Radiological Survey Instructions
Applicable Decommissioning Characterization Protocols and Procedures
Others As Appropriate

FINAL STATUS SURVEY REPORT

EXECUTIVE SUMMARY

INTRODUCTION

- Report Purpose
- Survey Scope
- Report Content

SUMMARY OF CHARACTERIZATION ACTIVITIES

- Data Quality Objectives Used
- Sampling and Field Measurement Methods, Equipment And Procedures
- Laboratory Analysis

BUILDING / CLUSTER DESCRIPTION

- Physical Description

- History of Buildings
  - Include Releases and Fires

- Current Operations
- RCRA and CERCLA Designated Areas

SURVEY RESULTS

- Radiological
- Chemical
  - Lead
  - Beryllium
  - Other Metals
  - PCBs
  - Chlorinated Solvents
  - Other Organics
  - Others

DECOMMISSIONING WASTE TYPES AND VOLUME ESTIMATES

DATA QUALITY ASSESSMENT

ANALYSIS AND INTERPRETATION OF RESULTS

- Discuss results in terms of decision rules and final disposition
- Discuss any decision limitations

REFERENCES

APPENDICES

DEMOLITION MONITORING PLAN

INTRODUCTION

Purpose
Monitoring Scope
Data Life Cycle (see B123 plan)

DEMOLITION ACTION DESCRIPTION

Summarize physical description, operating history, and general building conditions
Summarize RLC findings, including nature and extent of contamination
Summarize demolition plan, including activity sequencing

DATA QUALITY OBJECTIVES

Present DQOs from the Characterization Manual; adjust accordingly

The Problem
The Decision
Inputs to the Decision
The Project Boundaries
Decision Rules
Limits on Decision Errors
Optimizing the Design for Obtaining Data

SAMPLE COLLECTION AND ANALYSIS

- Discuss use of site-wide environmental monitoring network, including any increased collection and analysis of filters from ambient air monitoring stations.
- Discuss use of any additional ambient air monitors, portable surface water samplers, and groundwater monitoring wells.
- Discuss sampling and field measurement/survey methods and procedures per contaminant type.
- Specify number of samples, sample locations, sample and survey grids, analytes, etc.
- Specify equipment and instruments to be used, and required detection limits.
- Include subsections on sample handling procedures, QC samples, sample designation, personnel and equipment decontamination, and waste management.
- Discuss laboratory analysis (who, how, procedures, QA/QC, etc.).

HEALTH AND SAFETY

- Discuss how monitoring activities implement the RFETS ISM Program.
- Discuss PPE based on building and COCs (hazards identification).

- Discuss ongoing data review used to assess adequacy of controls and implementation of any control changes needed.

QUALITY ASSURANCE

Applicable QA Programs
Personnel Training and Qualification
Document Control and Records / Data Management
Change Control
Procurement
Inspection and Acceptance Testing
Assessments and Continuous Improvement

PROJECT ORGANIZATION (Roles and Responsibilities)

REFERENCES

APPENDICES

Radiological Survey Instructions
Applicable Decommissioning Characterization Protocols and Procedures
Others As Appropriate

DEMOLITION MONITORING REPORT

EXECUTIVE SUMMARY

INTRODUCTION

Report Purpose
Monitoring Scope
Report Content

DEMOLITION ACTION DESCRIPTION

Include description and history of building

SUMMARY OF MONITORING ACTIVITIES

Data Quality Objectives Used
Sampling and Field Measurement Methods, Equipment And Procedures
Laboratory Analysis

DEMOLITION MONITORING RESULTS

Radiological
Chemical

REQUIRED ACTIONS TAKEN

Discuss actions (controls implemented) to meet performance expectations and regulatory requirements

DATA QUALITY ASSESSMENT

REFERENCES

APPENDICES

65/65